

Lunar Halos.—1st, Iowa, Cal., Neb., Md., Mass., R. I., N. Y., Pa., Wis., Dak. 2nd, Ill., Ind., Cal. Nev., N. M., Cal., Kan., Iowa, Ohio, Ky., Nev., Neb., N. J., Wis. 3rd, Cal., Col., Tex., Dak., Ill., Tenn. N. J., R. I., Conn., Mo., Neb., N. Y., Va., Wis. 4th, Cal., Nev., Tex., Minn., Ill., Mass., R. I., Dak., Mo. N. J., N. Y., Ohio, Va. 5th, Ind., Cal., N. M., Iowa, Minn., Tenn., N. J., Conn., Neb. 6th, Cal., Neb., Kan., Miss., Ill., Mass., Conn., Mo., Tex., Va. 7th, Ill., Ind., Iowa, Dak., Wis., Mich., Ohio, W. Va., Mass., Maine, Mo., Va. 8th, Iowa, Cal., Nev., Minn., Mich., N. Y., Mass., Conn., Vt., Dak., Mo., Neb. 9th, Col., Neb., Kan., Me., Utah. 10th, Cal., Col., Iowa, N. J., La. 11th, Iowa, Tex., Minn., Ohio. 12th, Iowa, Minn., Ohio, Conn., Wis. 13th, Ind. 14th, Cal., S. C. 16th, Cal. 17th, Nev., Mo. 18th, N. M. 19th, N. M. 20th, Va. 21st, Neb. 26th, Iowa. 28th, Ill., Iowa. 29th, Ill., Cal., Wis. 30th, Ill., Cal., Nev., Tex., Dak., Wis., Minn., Tenn., N. C. 31st, Ill., Iowa, Neb., Wis., Minn., Ind., Conn., N. J., N. Y., Pa., Va.

Mirage.—Burlington, Vt., 15th, 26th; New London, Conn., 8th, 12th, 17th; McPherson, Bks., Ga., 12th; Princeton, Cal., 15th; New Bedford, Mass., 1st, 13th; Genoa, Neb., 29th to 31st.

Rainbow.—Washington, D. C., 26th, 10:20 a. m., rainbow observed in zenith.

MISCELLANEOUS PHENOMENA.

BOTANICAL.—*Massachusetts*—Somerset, ground open and farmers plowing until the 15th. *Kansas*—Independence, 11th, farmers plowing. *North Carolina*—Fayetteville, 31st, Japonicas budding, violets in bloom. Wilmington, 31st, roses in full bud, one in bloom; geraniums in garden still green. *Utah*—Camp Douglass, grass and clover remained fresh and green until the 7th.

BIRDS.—*Geese*—Winnemucca, Nev., 5th, flying SW.; Des Moines, Ia., St. Louis, 16th, S.; Newport, R. I., 11th, NW.; Somerset, Mass., 23rd, S.; Fall River, Mass., 23rd, S. in large numbers; Corning, Mo., 24th, 26th; Oregon, Mo., 5th, 8th; Clear Creek, Neb., during month; Howard, Neb., 27th, S.; Flushing, N. Y., 8th, N.; Melissa, Tex., 5th, 9th; Riley, Ill., 9th, SE. *Snow-birds*—Monticello, Ia., 19th, 29th; Oregon, Mo., 4th, 8th, 13th, 15th; Contoocookville, N. H., 4th. *Blackbirds*—Oregon, Mo., 8th. *Woodpeckers*—Monticello, Ia., 10th. *Bluejays*—Monticello, Ia., 8th. *Ducks*—Daytona, Fla., 1st, flying S.; Monticello, Ia., 4th, S.; Creswell, Kan., 2nd, 5th, 30th; Oregon, Mo., 4th, 5th; Palermo, N. Y., 5th, S. *Tree sparrows*—Somerset, Mass., numerous during month. *Owls*—Norfolk, Ohio, hooting 27th.

METEORS.—Cheyenne, Wy. T'y, 16th, 9 p. m., large meteor moving south to north, elevation 45°. North Platte, Nebr., 26th, 9:50 p. m., small but very brilliant meteor moving from zenith to about 15° above NE. horizon, where it exploded, trail of light smoke vanished almost instantly. Davenport, Iowa, 27th. Toledo, 30th. Morgantown, 30th, 7:10 p. m., remarkably brilliant meteor fell from a point a little west of south, at an altitude of about 60°; color deep blue, changing to white, then golden, then crimson; path nearly perpendicular to the horizon; exploded within 20° of the horizon, remained visible 15 seconds; 7:20 p. m., small meteor in same path, leaving blue trail. Indianapolis, 28th. Savannah, 12th. Fort Whipple, Va., 30th, 7:10 p. m., very brilliant meteor, altitude about 40° above NW. horizon, following a vertical downward course until its disappearance; at about 20° above the horizon there spread out from it a tail resembling that of a comet, of a rich vermilion color; its motion was comparatively slow, remaining visible for about two seconds. Bangor, Me., 1st. Princetown, Cal., 12th, very large meteor, moving from east to west, light equal to half daylight, train visible several seconds. Monticello, Iowa, 12th. Cresco, Iowa, 12th. Woodstock, Md., 5th, 6th, 11th, 12th, 16th, 25th. Rowe, Mass., 22d. Oregon, Mo., 5th, 17th. Freehold, N. J., 2d, 19th. Atco, N. J., 22d. Linden, N. J., 6th. Waterburg, N. Y., 20th. Wappinger's Falls, N. Y., 20th, 25th, 30th. Flushing, N. Y., 29th, 30th. Fayetteville, N. C., 8th, 27th. Westerville, Ohio, 12th, 15th. Jacksonburg, Ohio, 30th. Tioga, Pa., 30th. Fallsington, Pa., 15th. Wytheville, Va., 12th. Yankton, 4th. Castroville, Tex., 6th.

Zodiacal Light.—Savannah, 22nd, 23rd, 25th; Newburg, Vt., 19th; New Corydon, Ind., 6th, 7th, 23rd, 26th, morning, 25th, morning and evening; Monticello, Ia., 28th, evening; Somerset, Mass., 13th, 14th, 16th, 18th to 20th, 22nd, 23rd, 24th, evening; Cambridge, Mass., 14th, 16th, 19th, 23rd, 24th, 25th, evening; suspected 18th, 22nd; Fall River, Mass., 18th, evening; Oregon, Mo., 23rd, 24th, evening; Atco, N. J., 16th to 18th, 20th, 22nd to 24th, evening, 24th, 28th, morning; Waterburg, N. Y., 20th, evening; Bellefontaine, Ohio, 12th; Wytheville, Va., 24th, 25th, 27th; Southington, Conn., 16th, 23rd to 25th; Washington, D. C., 17th, 6 p. m., 18th, 6:30 p. m., 19th, 6 p. m., faint, 20th, 6:15 p. m., extending 90° from the sun, 21st, cloudy, 22nd, 6 p. m., suspected, 22rd, 7:30 p. m., certain, but faint—long and narrow, 23rd, 5:30 a. m., bright, 23rd, 6 p. m., bright—extending 90° from sun, 24th, 6 p. m., bright, sharply defined—extending 80° from sun, 25th, 6:15 p. m., bright, broad, ill-defined—axis passes south of Venus by several degrees, 26th, cloudy, 27th, 6 p. m., moonlight—dark disk, remarkably bright: 28th, clear—moonlight—dark disk not very bright, 29th, cloudy, haze, 30th, moonlight.

Polar Bands.—Leavenworth, Kan., 16th; Dubuque, Iowa, 29th; Milwaukee, 7th; Savannah, 8th, 19th; Wilmington, N. C., 2nd, New Corydon, Ind., 7th; Taber, Iowa, 29th; Guttenburg, Iowa, 7th, 31st; Danville, Ky., 12th, 13th; Gardiner, Me., 19th, 27th; Plattsmouth, Neb., 6th; Clear Creek, Neb., 1st, 2nd, 3rd, 6th, 7th, 9th, 20th; Auburn, N. H., 1st, 8th; Wytheville, Va., 7th, 8th, 12th, 13th, 18th, 19th, 29th.

Prairie Fires.—Keokuk, Iowa, 5th; New Orleans, La., 18th; Eagle Pass, Tex., 3rd, 17th.

Earthquakes.—San Jose de Costa Rica, October 31st, 9:30 a. m., very feeble shock. November 3d, 5:30 p. m., feeble shock; 8th, 8:15 p. m., feeble shock; 23d, quite strong shock. U. S. Naval Hospital, Yoko.

hama, Japan, November 5th, 0h 57', light shock; 10th, 1:47 a. m., light shock. Alajuela, Costa Rica, November 26th, 1:40 a. m., earthquake of short duration. Red Bluff, Cal., December 9th, 3:20 p. m., severe shock, lasting 15 to 20 seconds, motion upward and downward. Flushing, N. Y., 24th, 9 p. m., slight shock from N. to S., lasting five minutes and accompanied by a low, rumbling noise.

Sunsets.—The characteristics of the sky at sunset, as indications of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Corps Stations. Reports from 103 stations show 3,173 observations to have been made of which 36 were reported doubtful; of the remainder 2,630 or 82.9 per cent., were followed by the expected weather.

Sun Spots.—Monthly record of observations by Mr. D. P. Todd, Nautical Almanac office, Washington D. C., communicated by Prof. S. Newcomb, U. S. Navy, in charge of that office:

Dec., 1878.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Remarks.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
6th, 4 p. m...	0	0	0	0	0	0	0	0	
11th, 2 p. m...	0	0	0	0	0	0	0	0	
12th, 2 p. m...	0	0	0	0	0	0	0	0	
13th, 3 p. m...	0	0	0	0	0	0	0	0	
16th, 2 p. m...	0	0	0	0	0	0	0	0	
18th, 4 p. m...	1	1	0	0	0	0	1	1	
19th, 2 p. m...	0	0	0	0	0	0	1	1	Faculae; spot small.
24th, 3 p. m...	0	0	1	1	0	0	1	1	Faculae.
28th, 2 p. m...	0	0	0	0	0	0	0	0	
30th, 2 p. m...	0	0	0	0	0	0	0	0	

Mr. Jay Harcourt, at Wappinger's Falls, N. Y., examined the sun on the following days, but observed no spots: 1st, 4th, 8th, 14th, 16th, 19th, 21st, 25th, 30th, 31st. Mr. David Trowbridge, at Waterburg, N. Y., examined the sun on the following days, but observed no spots: 1st, 2nd, 3rd, 5th, 6th, 8th, 12th, 13th, 18th, 22nd to 24th, 29th to 31st. Observations were also made at Ft. Whipple, Va., from the 20th to the 31st, and no spots observed.

NOTES AND EXTRACTS.

In the *American Journal of Science and Arts* for January, 1879, Professor Loomis publishes his Tenth Paper of "Contributions to Meteorology." With respect to storms of the Atlantic ocean, he has examined seventy-seven cases of low areas near the coast of the United States, and was able to follow thirty-six of them, with considerable confidence, entirely across the Atlantic Ocean, but eight of the storms became merged with other storms before reaching the European coast, leaving only twenty-eight low areas which reached the coast of Europe. Prof. Loomis examines the seventy-seven depressions, with respect to their first appearance, lowest isobars, respectively, in longitudes 60°, 30° and 0° W. of Greenwich; average velocities between those longitudes respectively, and the highest wind with the direction, on the English coast, at the approach of each low area. From his examination, he concludes:

"We see from this table that in one year there are on an average only eighteen different storms which can be traced by means of Hoffmeyer's charts from the coast of the United States across the Atlantic. If for each day we had two good charts, instead of only one, it is probable that a few more storms might be identified in their progress across the ocean, but it is doubtful whether the number would be greatly increased. Nearly all of these storms pursued a course north of east, and passed considerably to the north of Scotland. In only four of the cases did the low centre cross the meridian of Paris in a latitude as low as the northern boundary of England. The average track of the thirty-six low centres which are traced across the ocean, is shown by the means at the bottom of the table, where it is seen that the meridians of 60°, 30° and 0° were crossed in the latitudes 49°6, 58°0 and 63°3. Since the storm-centres generally passed 800 miles north of London, most of them did not exhibit much violence on the English coast. In half of the cases, the highest velocity reported was 3, denoting a very fresh breeze, and in only six of the cases was the velocity at any station on the English coast as high as 5, denoting a gale."

"We may hence conclude that when a centre of low pressure (below 29.5 inches) leaves the coast of the United States, the probability that it will pass over any part of England is only one in nine; the probability that it will give rise to a gale anywhere near the English coast is only one in six; and the probability that it will give rise to a very fresh breeze is one in two."

"One of the most noticeable circumstances connected with Atlantic storms is their slow rate of progress. This is due partly to the erratic course of the centre of the low area, and partly to the frequent blending of two low areas into one, whence it generally results that the most eastern centre appears to be pushed backward toward the west. In my eighth paper I have described a remarkable example of this kind of movement. In like manner the storms numbered 35, 39, 41, 51, 53, 70 and 72 of the preceding table appeared to be pushed westward by blending with storms of subsequent date. Aside from this cause of detention, there seems in the Atlantic ocean to be a special cause which frequently holds storms nearly stationary in position from day to day, and this cause is probably the abundance of warm vapor rising from the Gulf stream, in close proximity to the cold dry air from the neighboring coast of North America. Hence we see that when American storms are predicted to appear upon the European coast, and it is assumed that they will cross the ocean at the same rate as they have crossed the United States, such predictions will seldom be verified."